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with Reference to the Prin-  
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OBSERVATIONS ON POTT'S DISEASE,  
WITH REFERENCE TO THE  
PRINCIPLES OF TREATMENT AND THEIR APPLICATION.\*

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THE principles which govern the treatment of Pott's disease are somewhat as follows: It is tuberculous in character; therefore the general condition of the patient must be sustained by the constitutional and therapeutic measures that are indicated in other manifestations of tuberculous disease. It is a local affection of the bones and joints of the spine, accompanied by symptoms of pain and deformity that may be relieved or prevented by restraint of motion, protection from injury, and removal of superincumbent weight.

The treatment under which the general health is maintained, by which a proper attitude of the entire body is assured, which relieves pain and prevents deformity, is effective; when these conditions are not fulfilled, treatment is ineffective.

\* Read by title at the seventh annual meeting of the American Orthopædic Association.



The successful treatment of Pott's disease depends upon (1) a knowledge of the functions and relations of the different portions of the spine, in order that one may interpret the early symptoms of disease, because a diagnosis can and must be made before the stage of bone deformity if the best result is to be attained.

2. A knowledge of the deformities and complications of disease peculiar to the region affected, in order that one may foresee and guard against them, for the final deformities of Pott's disease differ very materially with the region of the spine involved.

3. An apprehension of the nature of deformity and of the conditions that favor or retard its progress.

4. An appreciation of the duration and extent of disease and deformity, of the quality of the patient and the nature of his environment, in order that treatment may be applied intelligently or that a necessary compromise may be made between what is best and what is possible. The treatment of the patient in distinction to the treatment of his deformity is one of the more common and difficult problems, because patients are not often seen in the early stages of disease. The popular idea of Pott's disease is that it causes a hump, that the diagnosis is made because of the hump, and that the treatment consists in the application of a brace or plaster jacket without regard to the extent or position of the hump or to the symptoms or complications of disease. Consequently patients are brought for treatment in all stages of deformity or suffering, it may be from symptoms or complications that may call for special treatment, either because they directly influence the course of the affection or indirectly increase the tendency to deformity.

In one, the constitutional depression of the tuberculous disease is out of proportion to its local manifestation ; in

another, great deformity has been acquired with practically no effect on the general condition. The complication of abscess may from its position endanger life in one instance, while in others it may increase the tendency to deformity, or interfere with effective support, or remain for a time and disappear without symptoms or consequences. The treatment which may be most effective in childhood, when the danger of deformity is greater than the danger to life, may not be applied to the adult, for whom the relative danger of the constitutional and local disease is reversed.

The object of treatment is the prevention of deformity; not only because the effect of treatment is estimated by the degree of ultimate deformity rather than by the survival of the patient, but because deformity itself, after complete recovery from constitutional and local disease, by its distortion and compression of vital organs, is a constant source of weakness and danger.

To apprehend the nature of deformity, its causes and final results, one must bear in mind the fact that the spine is a flexible column, which, balanced under the influence of the force of gravity, is constantly changing its shape to accommodate itself to the different attitudes and movements of the body.

If by disease the function of one portion is interfered with, another part must accommodate itself to the change.

If one section is deformed or thrown out of its true relation to the weight line, another part must change in the opposite direction.

These compensatory changes, though bearing a necessary relation to the original cause, may, in the growing child, become exaggerated and independent deformities, or permanent distortions may be acquired which originally were merely symptomatic of disease. The deformities of Pott's disease may thus be divided into two groups, the

essential and the non-essential. The essential deformities are those caused by destruction of bone and loss of growth—two factors modified to a great extent by early diagnosis and efficient treatment.

Pott's disease is a destructive process which affects the bodies of the vertebræ, the weight supporting portion of the spinal column. As the effect of weakness and loss of support, the superior section of the spine inclines forward, bringing more weight, and thus the influence of attrition, to bear on the diseased area. The more rapid the destructive process, the more often abscess complicates the condition; this abscess may dissect its way down the spine, infecting other vertebræ in its progress. It is apparent, then,

that while the disease causes deformity, the deformity may increase the disease.



FIG. 1.

FIG. 2.

The non-essential and more distinctly preventable deformities are those which depend upon the symptoms or complications of the disease; one of these is muscular spasm. In disease of the cervical region, for example, the head may be drawn into a wryneck position, which, if allowed to persist, becomes a permanent deformity, for contracted tissues do not grow and the bones of the spine quickly accommodate themselves to the changed condition

of weight and function; or abscess which involves muscles and fascia may induce a faulty attitude. This is well illustrated in disease of the lower region of the spine, in



which the compensatory lordosis or overerectness of the body is one of the favorable factors in prognosis (Figs. 1 and 2). When, however, psoas abscess causes flexion of the thighs, the erect posture is impossible (Fig. 3); thus the habitual attitude becomes most unfavorable and, if it is allowed to persist, permanent and unnecessary deformity may result (Fig. 4).

Simple weakness is another element of deformity. When one sees a child suffering from dorsal disease walking about in the squatting attitude of weakness, supporting the body by the hands on the knees, it is very evident that treatment is ineffective, because a proper attitude is not maintained.

After the cure of the primary disease, the resulting deformity and the general weakness favor secondary curvatures of the spine, just as weakness and faulty attitudes may cause postural curvatures without the influence of local disease.

When the spine is distorted, the thorax must, in a certain degree, participate in the change; but the exaggerated pigeon-breast deformity of dorsal disease can be prevented by efficient treatment.



FIG. 3.

FIG. 4.

The natural tendency of Pott's disease is to cause a right-angled deformity at the point of weakness. The opportunity for deformity is greatest when the middle of the spine is diseased, because the column is broken in the center. The opportunity for deformity is small when either extremity is affected, because the deformed portion is insignificant compared to that which remains intact. It is evident, then, that it is not the mere angular projection, the direct and essential effect of the local disease, which is of importance, but that the true measure of deformity is the effect of the disease or deformity on the spine as a whole. (Contrast Figs. 6 and 7.)

Each region of the spine, because of its position, functions, or relations, presents certain peculiarities which influence prognosis and treatment. Disease of the occipito-axoid section, the region of true joint motion, is not infrequently a primary affection of the synovial membrane; consequently, more acute in symptoms and rapid in progress.

Disease of this region is more dangerous because of the proximity of the vital centers and because of the possibility of sudden displacement and pressure on the cord.

It is not infrequently complicated by abscess, which, unable to find an outlet, dissects its way about the contiguous vertebræ, or forms a tumor in the throat which may interfere with breathing and swallowing.

On the other hand, because of the acute symptoms, an early diagnosis is usually made, and, under favorable circumstances, the course of the disease is short and the result favorable.

The most disastrous deformity of this region—one not infrequently seen in untreated cases—is caused by the falling forward of the head so that the chin becomes fixed upon the sternum. The indications for treatment are to



prevent ultimate displacement of the head by fixing it in the line of the normal spine and at a right angle to it.

The prognosis in disease of the middle of the neck is favorable from all standpoints, because the special movements of the head are unaffected and because the opportunity for final deformity is slight. Children are often brought for treatment in whom the right-angled deformity, concealed by the occiput, has never been discovered by the parents or physician. Disease of this region is often accompanied by painful contraction of muscles and distortion of the head, often complicated by enlarged or suppurating glands or sinuses. The indications for treatment are therefore the removal of the superincumbent weight of the head and relief of muscular spasm by active extension.

In disease of the upper and middle dorsal region the prognosis is particularly unfavorable as regards deformity. The disease is not, as a rule, discovered at an early stage, because motion in this region is slight, and the symptoms are therefore not pronounced.

The normal posterior curvature of the spine is markedly exaggerated by slight deformity, while the compensatory lordosis tends to increase rather than to limit the kyphosis. The course of the disease is long, and the tendency to increasing deformity remains after complete cure of the local disease. The direct effect of deformity in compressing and distorting the thoracic viscera, and thus causing permanent weakness, is often very apparent (Fig. 5). A most serious and not infrequent complication of disease in this region is paralysis from secondary implication of the spinal cord. The indications for treatment are to combat all deformities, primary or secondary; to prevent the forward inclination of the head and neck; to restrain unnecessary movements of the arms; to draw the shoulders backward; to prevent

the secondary deformity of the chest and the compensatory lordosis.

The prognosis in disease of the middle of the spine is favorable if the patient is seen in the early stage, because the mechanical conditions are such as to make apparatus effective in relieving symptoms and preventing deformity.

If neglected, disease of this region produces the typical humpback (Fig. 6), the dwarfed stature, the square shoulders, the sunken head, and the distorted back and chest.



FIG. 5.

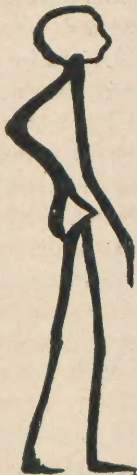


FIG. 6.

At a lower point the attitude symptomatic of disease tends to prevent great deformity, but in a large proportion of cases abscess and psoas contraction change this attitude to an unfavorable one. The indications for treatment are to restrain the awkward attitude of overrectness and to guard against the effect of psoas contraction. If this con-

traction is on one side only, the proper attitude of the spine may be maintained by providing the patient with a high shoe on the unaffected leg and crutches. If the contraction is of both sides, the patient should not be allowed to go about, but the irritation must be relieved by complete rest, or the abscess treated directly.

In the two regions of the spine, the upper and lower, in which abscess most often makes its appearance, radical operation is most often indicated; in the first, because of its position; in the second, because of its size and deform-

ing influence. In both these regions it is sometimes possible to reach and remove the source of suppuration. Except as an imperative necessity, the radical treatment of abscesses should not be undertaken unless the proper conditions for treatment can be assured, unless the source of pus can be reached, and unless there is a fair prospect of avoiding a suppurating sinus, which is often a source of danger and discomfort to the patient or interferes with effective support.

Abscess is a symptom of disease of which the importance is estimated by its effects. It may be prevented, and its extent and course may be modified by proper treatment of the cause of which it is a symptom. The aspiration of abscesses, with the injection of antituberculous remedies, is the treatment by preference. It is often effective and always harmless.

In the treatment of Pott's disease, rest and fixation in the horizontal position fulfill all the mechanical conditions: superincumbent weight is removed; the function of the diseased spine ceases; jars, injury, and overfatigue are impossible.

On the other hand, this treatment is incomplete in itself, because it must be supplemented by some form of mechanical support when the erect posture is again assumed.

It necessitates confinement and lack of exercise, the constitutional stimulation very essential in the treatment of tuberculous disease. The duration of Pott's disease is estimated in months and years; thus the moral effect of helplessness and confinement for such a period must be considered. In general, this treatment is a last resort, or is a temporary measure indicated for the relief of pain or threatened complications. In certain cases it is the treatment by preference; as in infancy and early childhood, because the



spine is in great part cartilaginous, the effect of disease in checking the growth and in the rapid production of deformity is very marked.

Young children submit very readily to a treatment that relieves them of discomfort and pain—that is, in fact, a simple prolongation of the helplessness of infancy.

The treatment is usually indicated for a longer or shorter time under the following conditions: In disease of the upper cervical region, because the head may be fixed, the danger of abscess lessened, dislocation and deformity prevented, pain relieved, and the progress of the disease checked before joint motion is greatly impaired. In disease of the upper dorsal region in young children, because progressive deformity is difficult to control, and a proper attitude difficult to maintain by apparatus. In disease of the middle thoracic region, in which the grunting respiration and the faulty attitude—the evidences of pain and weakness—show that treatment is ineffective. In disease of the lumbar region, in which the complication of psoas contraction makes the erect posture difficult or impossible.

This treatment is always indicated when pain is not relieved by other means; in the acute phases of disease, shown by pain, fever, and rapidly increasing deformity; in the complication of paralysis; or for the radical treatment of abscess.

To be effective, the rest treatment must always include fixation and often extension, and the apparatus must be entirely independent for its effectiveness of the bed on which it is placed. The most simple and useful appliance is, I believe, the frame first recommended by Bradford. The frame is made of light steel bars or gas pipe, a little longer and as wide as the child's body. This frame is covered by canvas, which is made smooth and rigid by straps or corset lacings

on the under surface; between the two layers a thin hair mattress may be inserted if desirable.

For older children it is well to apply the canvas cover in three sections, the narrow middle sheet to be removed for the use of the bed pan. This is unnecessary when diapers are used, the middle portion being protected by rubber sheeting.

Two or more sets of covers (sheets) are necessary, in order that the apparatus may be perfectly clean, for an unclean child is always neglected.

The patient must be fixed to the frame; the child who can raise the head or turn the body is uncomfortable and unhappy because he can not sit up, but when motion is impossible he quickly accustoms himself to restraint. To fix the patient, the shoulders and the head are the two points of advantage. If the shoulders are fixed, he can not turn over; and if the head is held, he will not attempt to sit up. The patient is usually attached to the frame in the following manner: A broad swathe surrounds the body and the frame, and straps attached to the frame are passed over the shoulders and through the axillæ, while a band across the chest prevents displacement.

Traction is indicated in cervical disease, and may be applied with advantage in disease of the upper dorsal region, with the aim of reducing deformity. Traction is easily accomplished by the ordinary halter attached to a slightly flexible steel upright, screwed to the brace after the manner of the jury mast. The amount of traction is regulated by raising the head of the frame; this allows the child to look about and is often as effective as the weight and pulley. Pillows beneath the head are not often indicated; in fact, it is sometimes necessary to loosen the upper part of the canvas so that the occiput may fall back, and to place a pad beneath the dorsal region if effective trac-

tion is to be applied in disease of that region; by this means in young children it is sometimes possible to reduce what is apparently deformity of bone. In the treatment of cervical disease, particularly in those cases in which the displaced bone projects forward, it may be necessary to place a pillow beneath the head as a temporary support.

Psoas contraction, even if complicated with abscess often disappears under the influence of rest. If, however, this position has long been maintained, it may be necessary to apply traction to the legs, as in the treatment of the deformities of hip disease.

The rest treatment is not often indicated in cases of great deformity, or in half-grown children or adults, except to meet certain indications, some of which have been mentioned; but it may be applied, and almost always with advantage, in the treatment of any region of the spine in infancy or early childhood. The patients may be taken into the open air daily, pain is relieved, the condition of the patient improves, while growth is often very rapid. Strong objection to the treatment is often made by the parents, but, once applied, its effects are so apparent that it may be continued without protest until other indications call for change.

If the essential conditions can be fulfilled by treatment which does not confine the patient to the bed or house—in other words, does not make an invalid of him—this is the treatment by preference.

The principle of support in the erect posture is this: If the body is inclined forward, the weight or pressure is supported by the bodies of the vertebræ. When the body is inclined backward or held in the upright position, more weight is supported by the articular processes. This is what is meant by relief from superincumbent weight as



effected by a spinal support; in addition, it fixes the spine and protects it from the injury of motion.

If the point of disease is above the thoracic section, superincumbent weight may be actually lifted; the body support then acts primarily as a base of support for the attachment which fixes or lifts the head.

The two types of appliance used are the plaster jacket and the spinal brace. Each of these has advocates who seem to base their conclusions on the failures of the one rather than on a personal comparison of the merits of the two; the desirability of interchanging the two methods of treatment is not often considered in the discussion or writings on this subject.

The jacket is brought into disrepute because it can be so easily and is so often applied by those who have a blind faith in its efficacy as a specific for humpback; the brace, because of a lack of knowledge of the principles of its construction or application.

The jacket is in fact a simple circular plaster bandage, which, like any other plaster bandage, depends for its efficiency on the size and irregularities of the surface to which it is applied and on the distance to which it extends on either side of the point to be fixed; for example, a plaster bandage applied to the knee of an adult may be an effective support, yet is useless on the leg of an infant. So the plaster jacket may be admirably effective when applied under proper conditions, and absolutely ineffective under others.

The plaster jacket provides a general support for the trunk as a whole; solid at the sides, front, and back; less accurately adjusted than the brace at the seat of disease. The abdomen is supported and counterpressure applied to the chest without uncomfortable tension. The jacket is most effective as a support in disease of the middle of the

back, less effective at a lower point, because the unyielding plaster does not allow the accurate adjustment to the pelvis that may be afforded by the brace. The brace, which is more effective in the lower region, is also more effective in the middle and upper dorsal region, because, by an appliance that I have elsewhere described (*Transactions of the Orthopædic Association*, vols. iv and v, and *Philadelphia Medical News*, November 19, 1892), backward traction may be applied to the shoulders, the leverage of the brace increased, and greater fixation assured by restraint of unnecessary forward-reaching movements of the arms, which act directly on the weakened spine to increase the deformity.

The jacket is admirably effective as a support in disease of the middle region in adults. It is a better support than the brace in cases of marked deformity and in cases of lateral distortion of the spine. When the neck region is involved the choice between the brace and jacket is more often one of relative comfort than of other importance. The jury mast is usually associated with the plaster jacket, but may equally well be used with the brace. In disease of the occipito-axoid region greater fixation of the head than is afforded by the jury mast is usually indicated; while in the painful distortion of the neck, associated it may be with suppurating sinuses or inflamed glands, the active traction afforded by the jury mast and halter is more comfortable and effective than the simple fixation of the metallic head supports. A disadvantage of the jury mast is that it is a very noticeable and rather offensive support. This is a matter of some importance, because head or chin supports are oftener indicated in disease of the dorsal region than is usually taught, not for the relief of pain, but to check the tendency to slowly increasing deformity. In such cases an inoffensive chin rest may be used when the jury mast would

not be tolerated. One may conclude, then, that while the brace and its attachments has a wider range of application, under certain conditions the jacket is more comfortable and more effective.

The faults of the jacket, as it is often applied, are that it is made too short below to support the abdomen, but allows it to bulge out beneath—thus it fails in support and predisposes to hernia; that it is not carried high enough to cover the chest and assure efficient counterpressure; that jury masts are not applied when they are indicated, are not strong enough to support the weight of the head, and that traction is not properly applied.

Most of the spinal braces sold in shops are useless; others are not properly fitted or the aprons are too short or made of yielding material which allows uneven and uncomfortable tension. While either method, properly carried out, may meet all the ordinary indications in treatment, there are occasions when one is distinctly preferable to the other, or when the appliances may be interchanged with advantage.

The object of mechanical treatment is to free the spine from the influence of local deformity (Fig. 7) and from the deforming influence of the symptoms and complications of disease; to distribute the compensation which is necessary and to limit that which is unnecessary.

The test of an appliance is its efficiency in meeting these indications; the test of treatment is its effect upon the patient.



FIG. 7.





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THE PHYSICIAN who would keep abreast with the advances in medical science must read a *live* weekly medical journal, in which scientific facts are presented in a clear manner; one for which the articles are written by men of learning, and by those who are good and accurate observers; a journal that is stripped of every feature irrelevant to medical science, and gives evidence of being carefully and conscientiously edited; one that bears upon every page the stamp of desire to elevate the standard of the profession of medicine. Such a journal fulfills its mission—that of educator—to the highest degree, for not only does it inform its readers of all that is new in theory and practice, but, by means of its correct editing, instructs them in the very important yet much-neglected art of expressing their thoughts and ideas in a clear and correct manner. Too much stress can not be laid upon this feature, so utterly ignored by the “average” medical periodical.

Without making invidious comparisons, it can be truthfully stated that no medical journal in this country occupies the place, in these particulars, that is held by THE NEW YORK MEDICAL JOURNAL. No other journal is edited with the care that is bestowed on this; none contains articles of such high scientific value, coming as they do from the pens of the brightest and most learned medical men of America. A glance at the list of contributors to any volume, or an examination of any issue of the JOURNAL, will attest the truth of these statements. It is a journal for the masses of the profession, for the country as well as for the city practitioner; it covers the entire range of medicine and surgery. A very important feature of the JOURNAL is the number and character of its illustrations, which are unequaled by those of any other journal in the world. They appear in frequent issues, whenever called for by the article which they accompany, and no expense is spared to make them of superior excellence.

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